

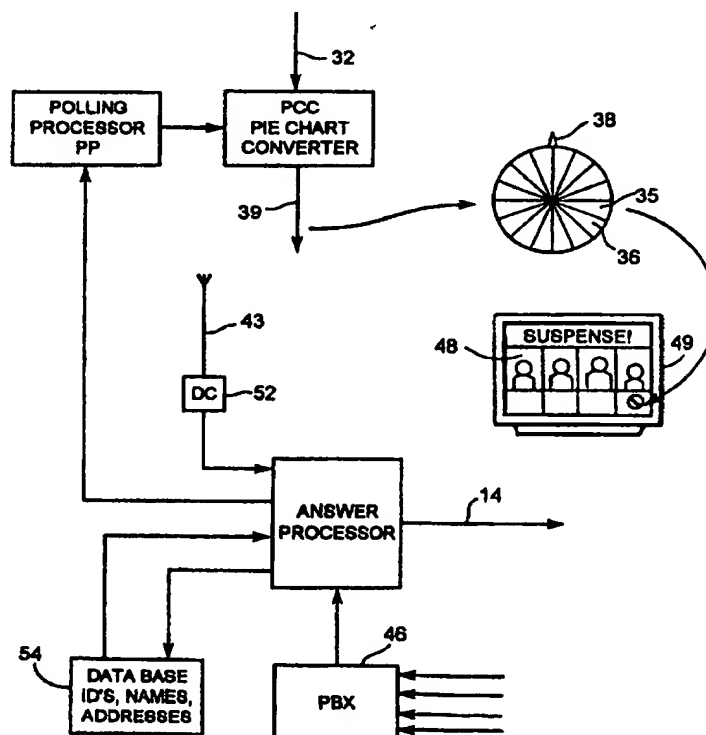
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Published*Without international search report and to be republished upon receipt of that report.***(54) Title: INTERACTIVE BROADCASTING SYSTEMS****(57) Abstract**

An interactive television or video system is disclosed, for communicating questions, means for distributing an encoded data channel in combination with the video signal for communicating qualification data, means at the user terminals for entering answer data (44), assessing the answer data against the qualifying data, and scoring the answer data to provide user scores, means for polling the user terminals to compare their user scores with an iteratively altered qualifying score level until the number of qualifying terminals falls within a predetermined range, and means to collect data from the then qualified terminals. The qualification data is preferably a subset or surrogate of data representing wanted answers. The encoded data is preferably transmitted as pie-charts (35) superimposed on images which are broadcast (48), the pie-charts being decoded by transducers affixed to the screens (49) of user terminals.



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INTERACTIVE BROADCASTING SYSTEMS

BACKGROUND OF THE INVENTION
FIELD OF THE INVENTION

This invention relates to interactive television and video systems, that is to say systems in which video signals, and usually accompanying audio signals, are distributed to display units of multiple users from a common source, and data
5 indicating user response is collected and processed. Certain aspects of the invention are also applicable to sound only systems. Such systems will be referred to generically as interactive broadcast systems, broadcast being used in the sense that signals are distributed to a target audience for
10 individual users within that audience to receive or not as they wish. The broadcast medium may be radio emission or a fixed signal transportation system such as cable or a computer network.

REVIEW OF THE ART

15 Such systems have long been used to assess audience acceptance of broadcast television signals, and various systems have also been proposed to allow television audiences to participate in polls, quizzes and games. As well as broadcast television, other modes of video signal distribution may be utilized, such
20 as cable television systems and data networks such as the Internet. All such systems present certain common problems for interactive broadcast systems, of which the most pervasive is that of obtaining response data from a large number of participants in an efficient, speedy and economical manner. A
25 second problem is the necessity in many applications for transmitting, to user equipment, coded or machine interpretable signals in addition to basic video and audio signals perceived by users. Such signals may include for example program identification and timing signals as well as other data needed
30 to control the user equipment. A third problem is that, in general, user equipment to implement the system must be

compatible with a wide range of user video reproduction equipment.

5 One particular application of interactive video systems is the playing by multiple users of competitive games and quizzes, and it is in the nature of such games and quizzes that there will be only a limited number of users that will achieve scores such that they need to be considered as potential winners. If most of the responses can be eliminated without the necessity of returning them to a central location for assessment, then the return response traffic can be greatly reduced. Although proposals have been made to prequalify data in the user equipment, for example in Canadian Patent No. 1,143,826 (Tocom, Inc.), simple application of a fixed prequalification standard at the user equipment, in order that a response in a competitive game or quiz be considered, will usually provide inadequate control of responses since scoring levels may vary very widely.

20 Interactive participation of users also usually requires the two way transfer of data between users and a control station, and suitable channels must be provided for the transfer of this data. Various modes for transferring data along with video and audio signals are known, for example closed captioning and other vertical interval signals, and data signals actually encoded into video and audio data, but the use of any of these techniques presupposes that all target users have or can be provided with equipment capable of extracting and making available these signals. Various modes are likewise available for transferring data from users to a control station, such as telephone, wireless or cable modem, but whatever means is used, the number of channels available simultaneously at the control station for receiving user data will necessarily be limited, as will the capacity for processing received data.

SUMMARY OF THE INVENTION

It is an object of the present invention to address these problems in interactive broadcast systems.

5 As observed above, in competitive interactive systems, as well as some other types of interactive systems, only a minor proportion of user responses in fact represent data that needs to be assessed by a control station, and it is therefore a first object of the invention to provide a means of pre-qualifying user responses at a user station to provide a score
10 on the basis of which the necessity to pass the response to the central station can be evaluated.

A second object is to provide a means to set dynamically a pre-evaluation score level which can limit the number of user responses to be evaluated at the central station to a level consistent with a number of channels available at the central
5 station for receiving such responses.

A third object of the invention is to provide a means for transmitting data to users superimposed upon video information which enables a user station to recover that data in a manner substantially independent of the video facilities available at
10 the user station. It has been proposed in U.S. Patent No. 4,613,904, to transmit data along with television video signals by incorporating 'rolling barcodes' into the television picture which can be read and decoded by a device attached to a television screen. A limitation of this system is that the
15 maximum rate of data transmission is very low, since data transmission is serial and the bit rate can be no more than the vertical scanning frequency at best.

The manner in which these objects are achieved is set forth in more detail in the following detailed description of an
20 exemplary embodiment of the invention, and in the appended claims.

SHORT DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic diagram of studio equipment utilized in an exemplary embodiment of the invention for implementing a quiz game for radio or cable transmission to a target audience of potential participants;

Figure 2 is a schematic diagram of further equipment provided at the studio and an associated control station;

Figure 3 is a schematic diagram of data receiving equipment provided at the location of each participating user;

Figure 4 is a schematic diagram of data processing and transmitting equipment provided at the location of each participating user;

Figure 5 is a plan view of a domestic answer terminal forming part of the equipment of Figure 4;

Figure 6 is a schematic functional diagram of the terminal of Figure 5; and

Figure 7 is a schematic diagram of a modem incorporated in the equipment of Figure 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention will be exemplified by its application to an interactive quiz game, but it should be understood that details of the game, its playing procedures and rules may be varied over a wide range within the scope of the invention as set forth in the appended claims, and the invention may be employed in interactive broadcasting applications other than quizzes and games; for example it could be used to invite and prequalify applicants or volunteers for jobs or community service, or in any other application where responses are invited, but only qualified responses are required, whether limited in number or not. Certain aspects of the invention have a wider field of

usefulness in enabling data to be broadcast to user locations in conjunction with video signals and recovered as such locations in a manner substantially independent of the video reproduction equipment provided at the user location.

- 5 Referring now to the drawings, a quiz game basically involves the putting of questions to contestants, who score points for correct answers, the objective for each contestant being to accumulate the highest possible score. This basic scheme may be varied by applying various forms of chance factors or
- 10 wagering which may affect the scores of contestants. While there is no particular difficulty in evaluating scores in a studio environment, the evaluation of scores of remote non-studio participants receiving video and audio signals over broadcast, cable or network links is much more difficult.
- 15 Referring to Figure 1, the elements shown in that figure are those necessary for studio production of an exemplary quiz game named 'Suspense' for the purpose of description, and suitable for remote audience participation. Studio contestants are located in a contestants' booth 2.
- 20 A random number generator 4 is used to select questions from a question and answer database 6, and the questions are displayed on a studio display 8, which also after a suitable delay displays answers received on line 12 from contestant answer terminals 10 in the contestant's booth 2, and may be used to
- 25 display names and pictures of winners received on a line 14. The studio display 8 and other functions of the system are controlled by an appropriately programmed microprocessor controller 100. The contestants' answers are checked against answers from the database 6. Video cameras 16 and 18 provide
- 30 images respectively of the contestant booth and the studio display which are suitably edited to provide a video signal onto which is superimposed a small insert discussed further below and supplied on line 20 to a superimposition circuit 21 providing a composite signal as shown in the insert 48 in

Figure 2. If the resultant signal is to be distributed by radio broadcast or cable, its colour information is encoded by an encoder 22 appropriate to the encoding system (for example NTSC) being used locally, and the signal is modulated onto an RF carrier by a transmitter 24 and applied to a broadcast antenna 26 or a distribution cable 28. If the signal is to be applied to a computer network then it is encoded into a format which can be transmitted over and decoded at stations on the network. All of the above functions are known, conventional and readily implemented.

In addition to the database 6, the random member generator also accesses a further database 30 of 'surrogate answers'. In practice the database 30 need not be a separate database since the surrogate answers may be stored in a field of the database 6, or derived by application of an algorithm to answers read from the database 6. The surrogate answers represent a subset of the data content of the answers selected so that the presence of such a subset in a contestant's answer corresponds to a high probability that the contestant's answer is correct. Typically the surrogate answer will consist of a selection of characters appearing in the correct answer, together with the number of characters occurring between those characters in a correct answer, suitably encoded into digital format, for example by use of the ASCII code. The encoded surrogate answer is applied to a line 32 for use as described below. An example of a surrogate answer is shown below:

ANSWER: VANILLA OR SRILANKANS
SURROGATE: -A--L-A -- --I-A-K--S

Referring now to Figure 2, data from the line 32 is applied to a pie chart converter 34. The pie chart converter is readily implemented by a programmed microprocessor, using routines already known in application programs for the generation of rasterised pie charts from input data. In this instance, the data bits forming words of ASCII data received by the converter

are represented by segments of a generated pie chart 35 in which the presence or absence of a video component represents a logical bit value. Conveniently, two byte words of ASCII data are encoded into 16 pie chart segments 36, but other word
5 lengths may be used. In a simplest arrangement, the bits of the word are represented by black or white segments in circumferential sequence, but other sequences may be used, and colour or other data may be superimposed, in order both to improve the appearance of the pie chart and make unauthorized
10 decoding more difficult. The chart may be provided with an orientation guide such as a tab 38, and is located by the superimposition circuit, to which it is passed by a line 39, in a corner of the video image 48 displayed by a TV set or monitor 62 at each user location. The pie chart generator can also
15 receive data on line 42 from a polling processor 40 receiving data from an answer processor 44 which also provides data on line 14 to the studio display 8 (Figure 1).

Answers on a line 43 from the answer database 6 are decrypted if necessary by a decryptor 52 and the resulting data passed to
20 and stored by the answer processor 44, which can also receive data from a private branch exchange (PBX) 46 provided with multiple incoming telephone lines over which data representing answers and user identifications of remote participants are transmitted on command as described further below. The answer
25 processor also generates commands passed to the polling processor as described further below, recovers participant data from a database 54, and passes data back to controller 100 for display and storage.

User terminal equipment is shown in Figure 4, and comprises in
30 this example a transducer 60 (Figure 3) applied to a television set or monitor 62 receiving by suitable means 64, over air, cable or network, the signal transmitted by transmitter 24; a contestant answer terminal (CAT) 66 (Figures 5 and 6); and a
35 modem 68 (Figure 7) connected to a telephone line 70 over which communication can be established to the PBX 46. The transducer

60, CAT 66 and modem 68 are connected by wireless links using radio frequency (preferably), infra-red, or ultrasonic transmissions, using known technology.

Referring to Figure 3, which shows the transducer 60
5 schematically, in plan and in elevation, the transducer comprises a flexible transparent disk 72 provided with an orientation tab 74, and a transparent low tenacity adhesive mounting layer 76 for removably mounting the disk to the screen
10 of the television set or monitor 62 over the pie chart display 35 (see Figure 2) with the tab 74 aligned with the pie chart tab 38. Beneath the disk 72 is a photovoltaic layer 78 which receives light from the screen of the television set or monitor and converts it into electrical energy stored in a battery or capacitor (not shown) to power the transducer 60, the circuitry
15 of which is implemented using CMOS or other low current consumption technology. A photoelectric transducer array 80 has a number of photoelectric transducers 82, one for each segment of the pie chart 35, connected to a transmitter circuit within a housing 84. In the transmitter circuit, the
20 transducers 82 are connected in parallel to inputs of a parallel to serial converter 86, which is loaded during each field of the picture displayed on the TV set. Whether a bit is loaded at a particular input depends upon whether the signal picked up from the transducer associated pie chart segment
25 reaches a particular threshold level.

A clock signal for controlling the parallel to serial converter is developed from the vertical refresh rate of the television set or monitor by the photovoltaic layer. This rate will
typically be 60 Hz for NTSC television sets, although it may be
30 preferred to divide this rate by two to the 30 Hz frame rate where interlaced scanning is used so as to provide greater reliability. The serial signal from the converter is clocked at a considerably higher rate into a recirculating shift
register 88, on receipt of a timing signal also developed from
35 the vertical refresh rate between successive scans of the pie

chart. The recirculating signal from the shift register, which has additional stages to hold suitable stop bits to mark the beginning of a word, is used to modulate an RF signal from a local oscillator 90 in a modulator 92. The shift register may conveniently be clocked by a signal divided down from the local oscillator. The modulated RF signal, which is at very low power, is radiated from an antenna 94, from which it may be picked up by an antenna 96 (Figure 6) in the CAT 66.

The CAT 66 is a hand held device having an alphanumeric keypad 98 and a number of function buttons including a 'play' button 102 and an 'enter' button 104. Optionally 'bet' buttons 106 and additional buttons 108 may be provided. The CAT 66 also has an alphanumeric display 112 so that entries may be viewed and checked.

The CAT is controlled by a microprocessor 110, which receives input from the keypad 98 and other buttons, and provides output to the display 112, all in conventional manner for a user terminal. External input is received from the transducer 60 by a receiver 114 associated with an antenna 116, demodulator 118, and a serial to parallel converter 120. External output from the microprocessor is passed via a parallel to serial converter 122, modulator 124 and low power transmitter 126 to an antenna 128.

The signal from the antenna 128 is received by an antenna 130 of a receiver 132 of the modem 68, which demodulates the signal and passes it to a microcontroller 134 which may store the data in memory 140 and possibly initiate a dialing sequence by means of a autodialer 136 in order to send out data through a telephone modem interface 138 to an central station on telephone line 70. The modem interface 138 may also answer calls, from the central station or an alternate billing authority, polling for data stored in the memory 140. The wireless modem 68 is conveniently configured to plug into a baseboard receptacle 142 (see Figure 4) providing power to a

power supply of the unit, and is provided with a jack 114 to receive a connection to the telephone line 70.

5 In use, and assuming that play of the exemplary game show is initiated at the studio or central station, questions and the "surrogate answers" associated with them are selected from the databases 6 and 30 employing the pseudo random number generator 4. The selected questions are displayed on the studio display 8 for the studio contestants and the studio audience. The questions are also visible on television sets or network
10 terminals receiving the game show. The studio contestants are in sound isolated booths and their cumulative scores are visible to the studio and TV audiences but are unknown to the contestants themselves. The viewing audience knows when an answer is correct but they do not know what the answer was.

15 The surrogates of the answers (if GOLDBERG is the answer its surrogate is __L__ __E__ G where__ represents a space) are passed to the pie chart converter which receives ASCII data and converts pairs of successive bytes into sixteen segment pie charts. The sequence of sixteen segment pie chart signals is
20 superimposed, one pie chart at a time, at the frame rate (of 30 frames per second in an NTSC system) on the distributed video signal which carries the picture of the question display and the contestants. Thus in addition to a conventional series of images, a series of pie charts accommodating 60 bytes per
25 second of data (in this example) reaches the screens of users tuned to the game show channel or site.

30 The sequence of pie charts is detected by the transducer 60 which has been adhered by the user to the left hand lower corner (for example) of the screen over the location where the pie charts appear. The transducer 60 converts the pattern of wedges to a pulse sequence which is transmitted to the hand held Contestant Answer Terminal (CAT) 66 by a modulated radio frequency signal. The sequence of pulses derived from the

successive pie charts appearing on the screen is stored in the memory of the microprocessor 110 contained in the CAT.

When contestants in their homes, or in the TV broadcast studio, answer questions (employing the keyboard of their Contestant Answer Terminal (CAT) 10 or 66, their answers are stored in the memory associated with the microprocessor of that terminal. These answers are compared letter by letter with the surrogate answers, letters and positions. If the answer matches the surrogate answer it is considered 'correct' and a 'correct answer' total in the memory is incremented. Additionally a 'total score' counter is incremental by a number of points assigned to that particular question (data as to the number of points may be transmitted by the pie chart converter).

According to an optional feature, bets based on the 'total score' accumulated can be made. Each question may have a different number of points assigned to it and a running total is maintained of the "total score". At any point in the game contestants can wager an amount equal to some or all of the total score accumulated using the 'bet' buttons 106 on their answer to a following question, and their total score will be adjusted accordingly.

At the end of the "game", which may be defined in terms of time, a specific number of questions, some random factor, or a combination of all three, a sequence of signals, is generated by the controller 100, translated by the pie chart converter, and passed by the transducer to the CAT 66, which results in the sequence of events below.

Assuming for example that 60 questions have been asked, the first instruction alerts all contestant terminals to check whether their correct answer total exceeds 50 (for example). Each terminal 66 meeting this requirement generates a command signal which is transmitted to its associated modem 68, causing it to auto-dial a particular phone number (or numbers).

The phone calls generated are received by the multi-line PBX 46, which for example may have 30 incoming lines. If all these lines become active, the system has established that more than 30 contestants have a correct answer total of 50 or more. The Answer Processor 44 accordingly causes a new set of pie chart signal sequences to be generated setting a new higher qualifying score, for example 58. These signals cause the previously selected terminals 66 to instruct their modems to hang up, and select only those terminals in which the correct answer total exceeds 58 (for example).

The sequence of operations previously described is repeated. This time it may be that the answer processor 44 observes that no line on the PBX has been activated. This tells the system that no contestant has answered 58 questions correctly and that the highest number of correct answers lies between 58 and 50. Thus the next interrogation alerts terminals whose correct answer total exceeds an intermediate score, for example, 53. After a number of iterations the number of lines activated will necessarily be above some minimum for example 10 or 20, and less than or equal to 30. At that time the answer processor causes a sequence of pie chart codes to be generated which results in the selected terminals transmitting the answers (contained in their microprocessor memories) via the wireless modem and the PBX to the answer processor. At the answer processor the transmitted answers are compared with the correct answers and ranked arithmetically according to their scores. The identification codes of the terminals are transmitted along the answers they contain. It is important to understand that not all of these answers are necessarily correct. They have been transmitted because their surrogates are correct. The identities of the ten (or twenty) individuals with the highest scores can thus be determined and made known in a matter of (at most) minutes to the TV viewing audience.

An unlikely case, which might nevertheless occur, is one in which all lines of the PBX are activated for the highest

possible "correct question total"; 60 in this example. In this case all thirty lines of the PBX would be answered and their answers accepted, and then another set of 30 active lines, and so on. Even if as many as 250 individuals succeeded in answering all questions correctly the processing time would only be increased by a fraction of a minute. A prize allocation algorithm could also be appropriately adjusted.

As previously mentioned the game may allot different scores to different questions or permit contestants to wager a proportion of their total score on each question by activating a particular "Bet" button before each question appears on the screen. If no button is activated a constant proportion (say 10%) of the cumulative total score may automatically be wagered and a fixed amount added or subtracted (if the answer entered was respectively correct or incorrect).

A procedure to determine the largest "total score" of this variant may proceed in the same manner as before up to the point at which the individuals with the largest number of correct answers are determined. It is possible, though not necessary, that among these contestants with the largest number of correct answers, one also has the highest total score. If this should not be the case, it is likely that the highest total score is not very much higher than the highest total score found among these contestants. Let us suppose the highest of these scores is 30,000. The system will employ the pie chart signal technique to alert all domestic terminals containing total scores greater than 35,000, and then increment up or down according to the number of lines responding on the PBX. If no lines respond for a score of 35,000, the next interrogation is for 32,500. If this results in 30 lines being activated the next interrogation is for 33,750 and so on. It is significant that, even if the highest score among the contestants with the largest number of correct answers is 30,000 and as many as a thousand contestants score as high as 200,000 (a very unlikely situation), the strategy employed will

determine the highest ten (say) total scores in less than a hundred interrogations or in about a minute.

In an alternative procedure, only total scores are iteratively processed in the same manner as correct question scores.

5 Depending upon the scoring and betting regime utilized, this may or may not be faster than the two stage process outlined above.

10 In the exemplary quiz show, a "Play" is defined as the actuation of the play button 102 during a particular defined time during the game show. The time is indicated by a visual and audible announcement on the TV accompanied by a sequence of "pie chart" signals which causes a record of an actuation in the play button 102 to be stored in the microprocessor's memory. A "Play" incurs a 'transaction cost'. Different games
15 shows may have different 'transaction costs'. The Consumer Answering Terminal (CAT) can be employed by different game shows or for other applications. This is accomplished by transmitting an identity code for a particular game show which is also stored in the microprocessor's memory (along with other
20 game show identifiers) as a result of the CAT receiving a particular sequence of "pie chart" signals. Transaction cost data is transmitted by the CAT to the modem 68 and stored in the memory of the latter.

25 Modems 68 are polled periodically (for example once a day, a week or a month). A single personal computer polling station can poll half a million modems a month. For a large city
several polling stations might be required. By means of normal telephone lines the modems associated with tens of millions of Contestant Answer Terminals (CAT) can be polled, and billing
30 information transmitted to the central station, or to a billing system run by a telephone company. The telephone company in that case receives a portion of the total revenue for billing and collection. The telephone company will credit the accounts of different game shows with the amounts contenders paid to

play the different games during the polling interval (days, weeks or months). The polling computer maintains a list of all of the phone numbers associated with the modems of all Contestant Answer Terminals (CAT). These phone numbers are
5 obtained when the Consumer Answer Terminal (CAT) and associated equipment is purchased or leased, communicated along with a serial number over the telephone line to polling centre by the user of the terminal.

10 An exemplary polling procedure consists of transmitting two codes to each modem 68 that has been polled. One of these numbers is a code transmitted on completion of a connection and signalling the modem to transmit information, relating to the number of plays and the particular games played since the last poll was taken, to the polling computer.

15 Additionally, an encoded security code is transmitted over the telephone line together with a ring signal using a technique similar to that employed for telephone call identification. Upon receiving this number it is compared with codes or codes
20 stored in the modem 68. If the comparison is valid, the line is taken 'off hook' to suppress the ring signal, a connection is established, and the code is transmitted which causes the recorded plays and payment information in the terminal's memory to be transmitted via the wireless modem 68.

25 The security code is for authentication to prevent the revenue collection procedure from being subverted by individuals skilled in communication technology. This second code (or code series) is periodically randomly altered and data to implement the change can be transmitted to the CAT 66 and thence the
30 modem using the microprocessor memory of the polling computer pie chart converter and any suitable form of encoding to ensure secure transmission. Such technologies are well known and need not be described here.

Randomly during the course of any of the game shows in which the CAT is employed, particular sequences of "pie chart" signals may be transmitted. If a "security number" stored in the CAT is not matched in response to these signals, the CAT may be programmed to clear critical sections of the microprocessor control memory thus rendering the CAT inoperable. In order for the terminal to become operable again, it must be returned to a dealer and reactivated by restoring the deleted data. The cost of this procedure may be used as a penalty for tampering which will discourage attempts at electronic subversion.

It is a feature of the invention that user terminals which have either a low number of correct answers or a low total score (the two can be different because of the use of the "Bet Keys") can be identified at the terminal so as to prequalify contestants or respondents having high scores and thus minimize the system bandwidth, while accommodating a very large number of terminals. At the same time it is rendered difficult for individuals skilled in telecommunication technology to intercept answers that are transmitted to the CAT using the "pie chart" signals, since 'surrogates' are transmitted rather than correct answers, as described above. Further security can be provided by using the transmission of the pie chart signals conveying a surrogate answer to mark the end of a period allowed for answering a corresponding question, and thus not even the surrogate answer is available until after the answer period has elapsed. It would be possible to use the pie chart converter to transmit complete answers, but this would be slower and less secure.

The 'pie chart' technique described for transmitting data along with a television or video signal has the advantage that it is substantially independent of the size, type and electronic construction of the user's television set or monitor, and of the size of its screen provided that the screen is luminescent or backlit to provide the necessary power and signal inputs to

the transducer 60. It may be employed in any application in which it is desired to transmit control data along with a video signal in a manner substantially independent of the display utilized.

5 It will be also be understood that considerable variation is possible in the implementation of the invention as described which is by way of example only. Thus, for example, the user equipment need not consist of three separate units connected by
10 wireless links. Wired links could be utilized, although less convenient, or the modem 68 could be incorporated into the CAT 66, and functions could be differently allocated between the units. Certain functions which have been described at both the studio and user terminals as separately controlled by separate microprocessors or microcontrollers could share a lesser number
15 of microprocessors. A number of different techniques are known for gathering data at a central station from a large number of user terminals, and these may be utilized in conjunction with the present invention, provided that they permit a suitable number of terminals to communicate simultaneously with the
20 central station over multiple lines or channels. For example, a computer network or most cable television networks provide bidirectional communication facilities including multiple upstream communication channels that may be used by the user terminals in place of telephone lines.

I claim:

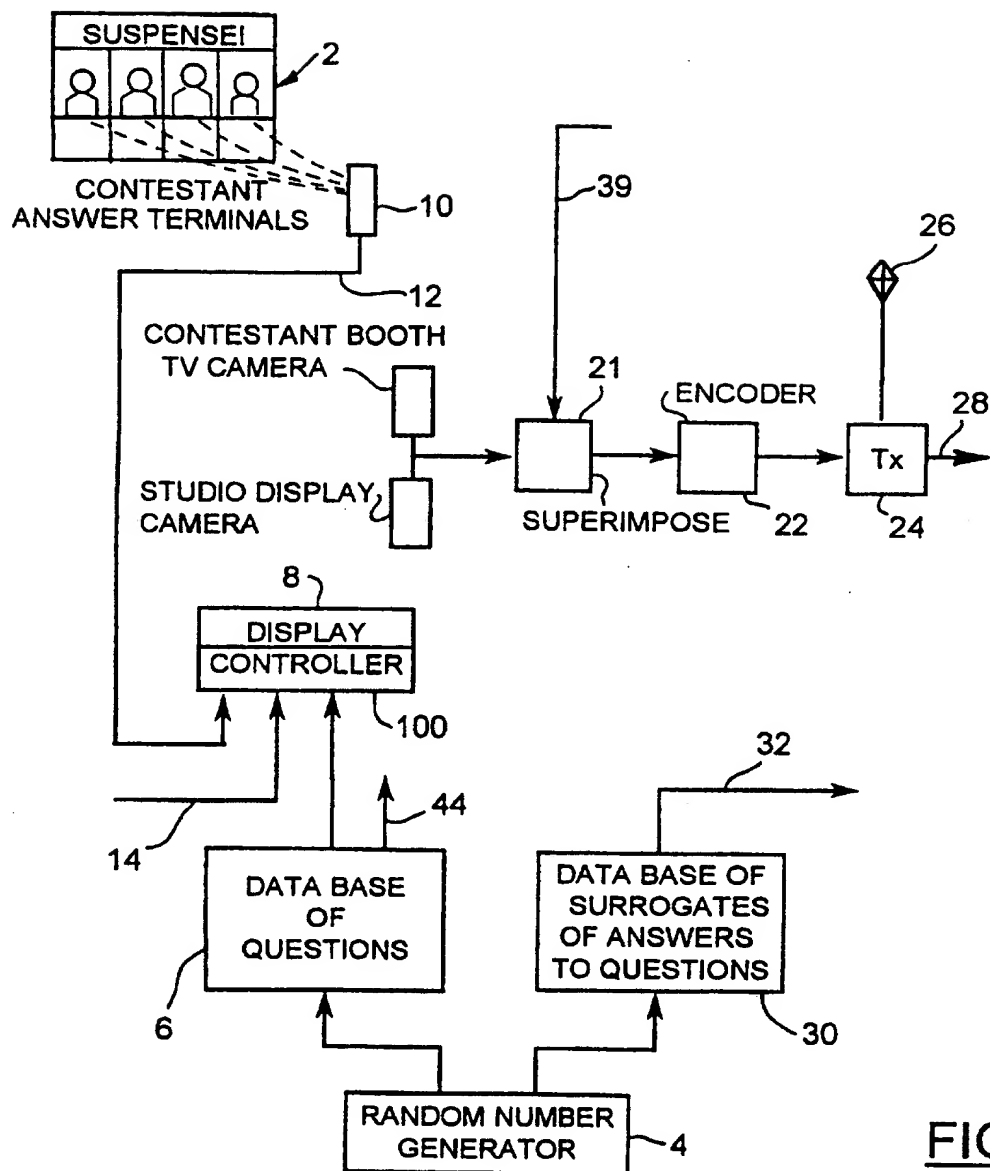
- 1) A system for communicating questions to plurality of user terminals for the entry of answer data, but collecting answer data only from a limited number of said terminals at which the answer data entered best matches criteria set by qualification data transmitted to the terminals, comprising means for distributing a common video signal to the user terminals for communicating questions, means for distributing an encoded data channel in combination with the video signal for communicating qualification data, means at the user terminals for entering answer data, assessing the answer data against the qualifying data, and scoring the answer data to provide user scores, means for polling the user terminals to compare their user scores with an iteratively altered qualifying score level until the number of qualifying terminals falls within a predetermined range, and means to collect data from the then qualified terminals.
- 2) A system according to claim 1, wherein the qualification data is a subset of data representing wanted answers to questions.
- 3) A system according to claim 2, wherein the wanted answer data is text, and the subset of data represents characters selected from the text and the relative positions of those characters within the text.
- 4) A system according to claim 1, wherein the encoded data channel is provided by encoding data within a portion of images provided by the distributed video signals for display at the user terminals, and each user terminal includes a display screen, and a transducer to receive said image portion from the display screen and decode data therefrom.

- 5) A system according to claim 4, wherein the image portion is a pie chart having multiple segments representing data bits, and the transducer has a circular array of sensors each sensing an image characteristic of a segment to recover the data represented by the segments.
- 6) A system according to claim 4, wherein the transducer is detachably adhered to the display screen of a user terminal, and includes photovoltaic means oriented to receive light from the display screen and convert it into electrical energy to power the transducer.
- 7) A system according to claim 1, wherein each user terminal includes a transducer for recovering data from said encoded data channel, a keyboard for entering answer data, and a modem for communicating said answer data to a central station on command from data recovered from said data channel.
- 8) Apparatus for transferring alphanumeric data embedded in a distributed video signal, comprising means to represent bits of said data as visual characteristics of segments of a series of pie charts and translate said pie charts into raster image data, means to insert said raster image data into a video signal, means to display on a screen said video signal with said series of pie charts displayed at a particular location, a transducer superimposed on said location and having an array of sensors for sensing the bit values represented by visual characteristics of each segment of each pie chart, and means to receive and reassemble the bit values sensed by the sensor array to recover said data.
- 9) A method of prequalifying character based data entered into user terminals for transmission to a central station, comprising transmitting to the terminals data representing identities and relative locations of selected characters

found in qualifying data, checking the data entered in each terminal for the presence of the selected characters in correct relative locations, scoring the data accordingly to provide a score at each terminal, and transmitting to the central station only data from terminals having a score meeting a score requirement.

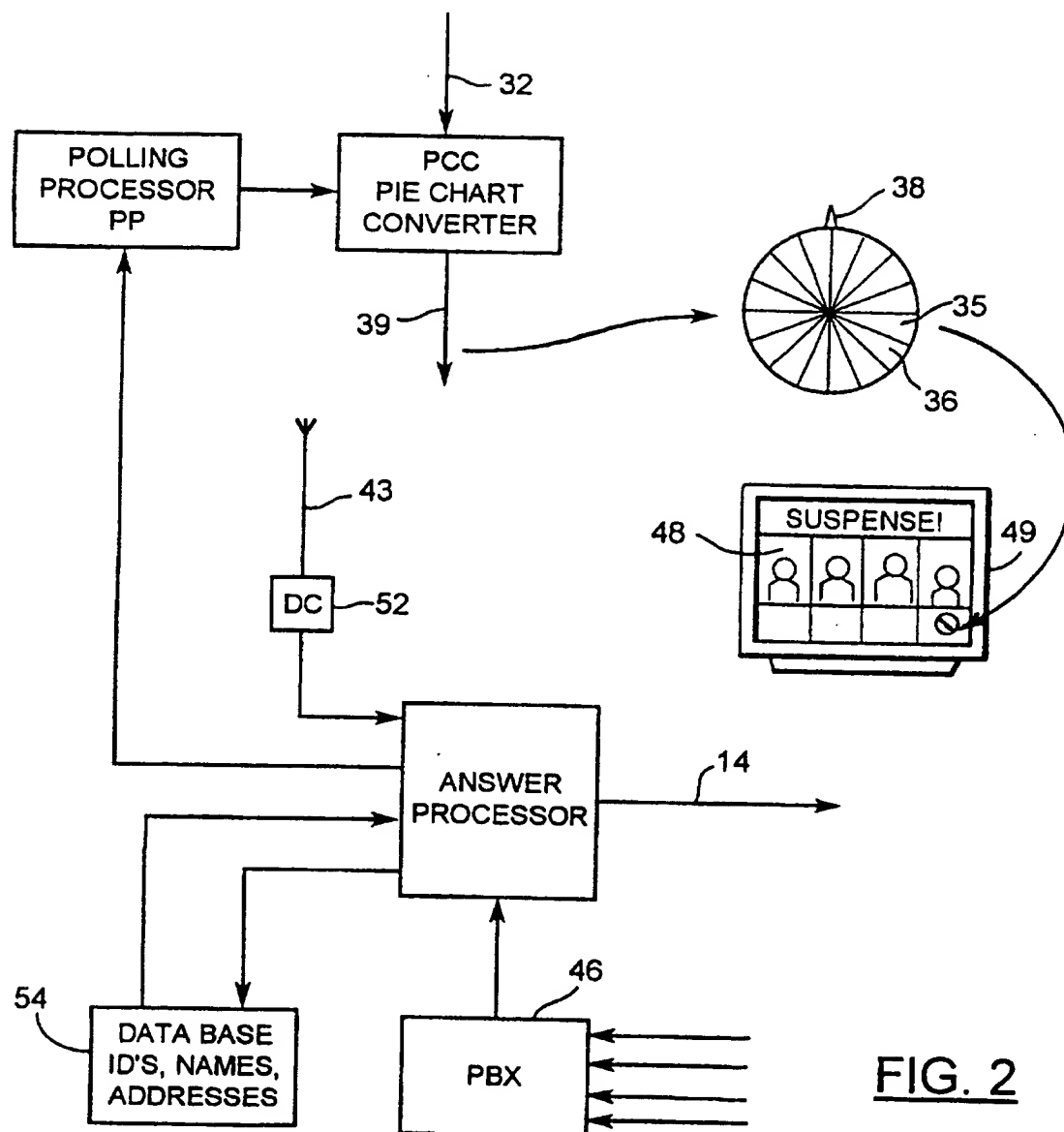
- 10) A method according to claim 9, wherein the score requirement is set by iteratively adjusting the score requirement such that a desired number of terminals have a score meeting the score requirement.

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FIG. 1

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**FIG. 2**

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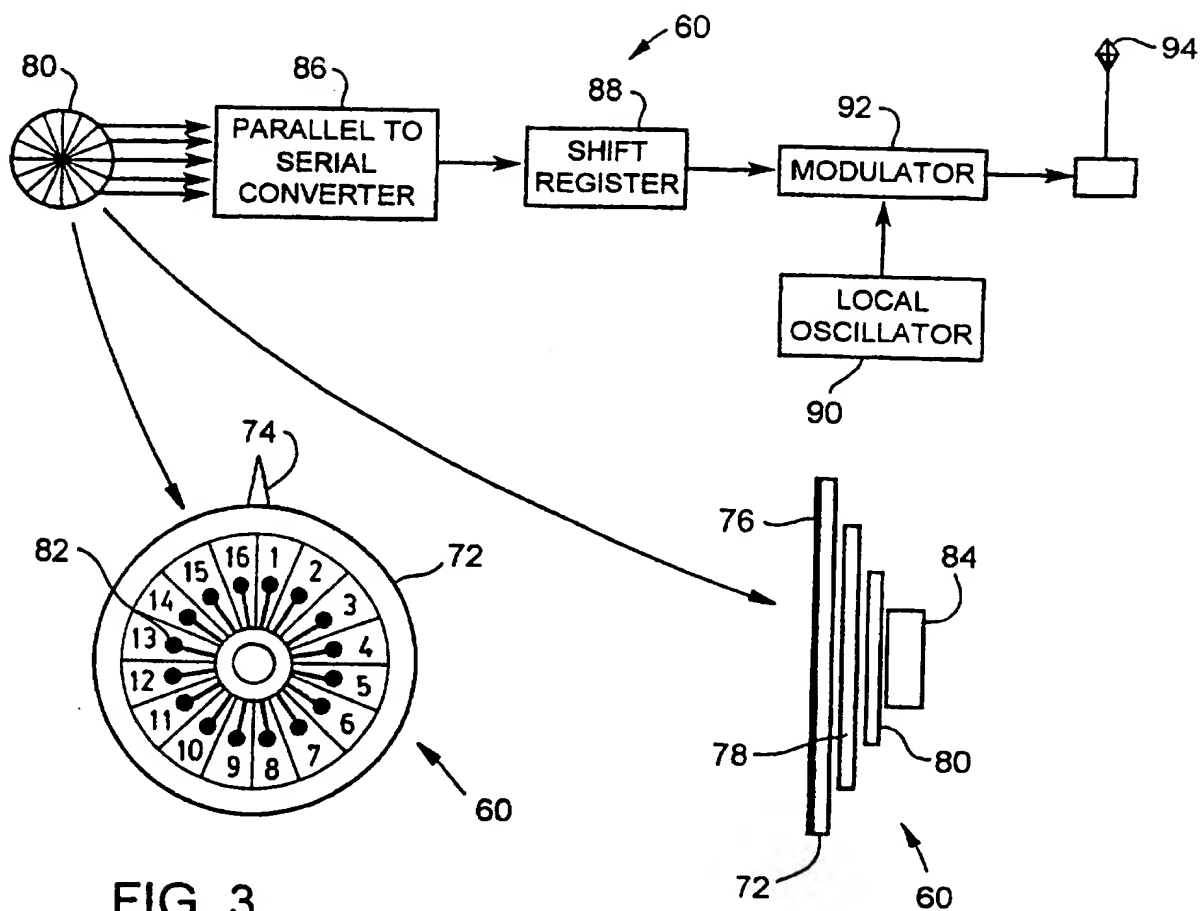


FIG. 3

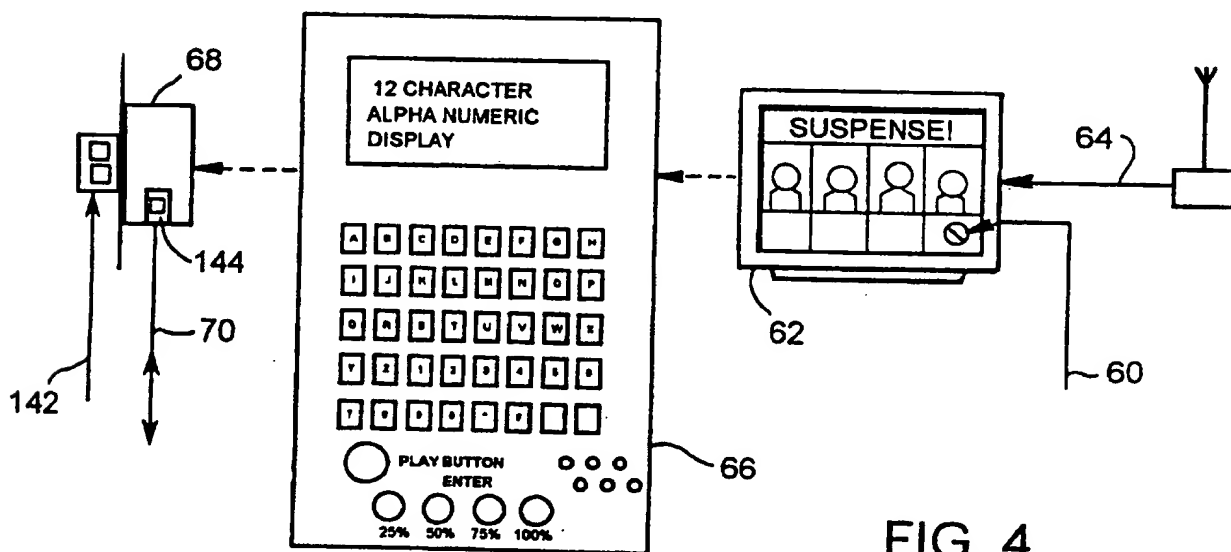
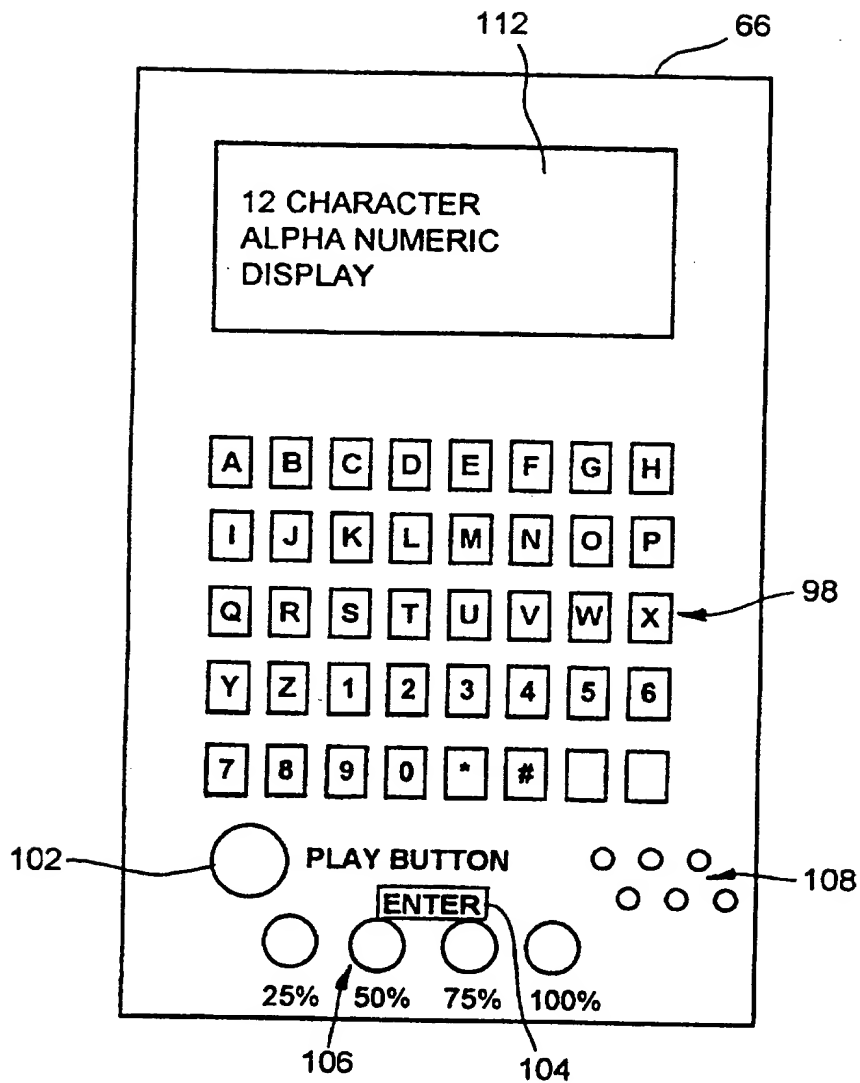


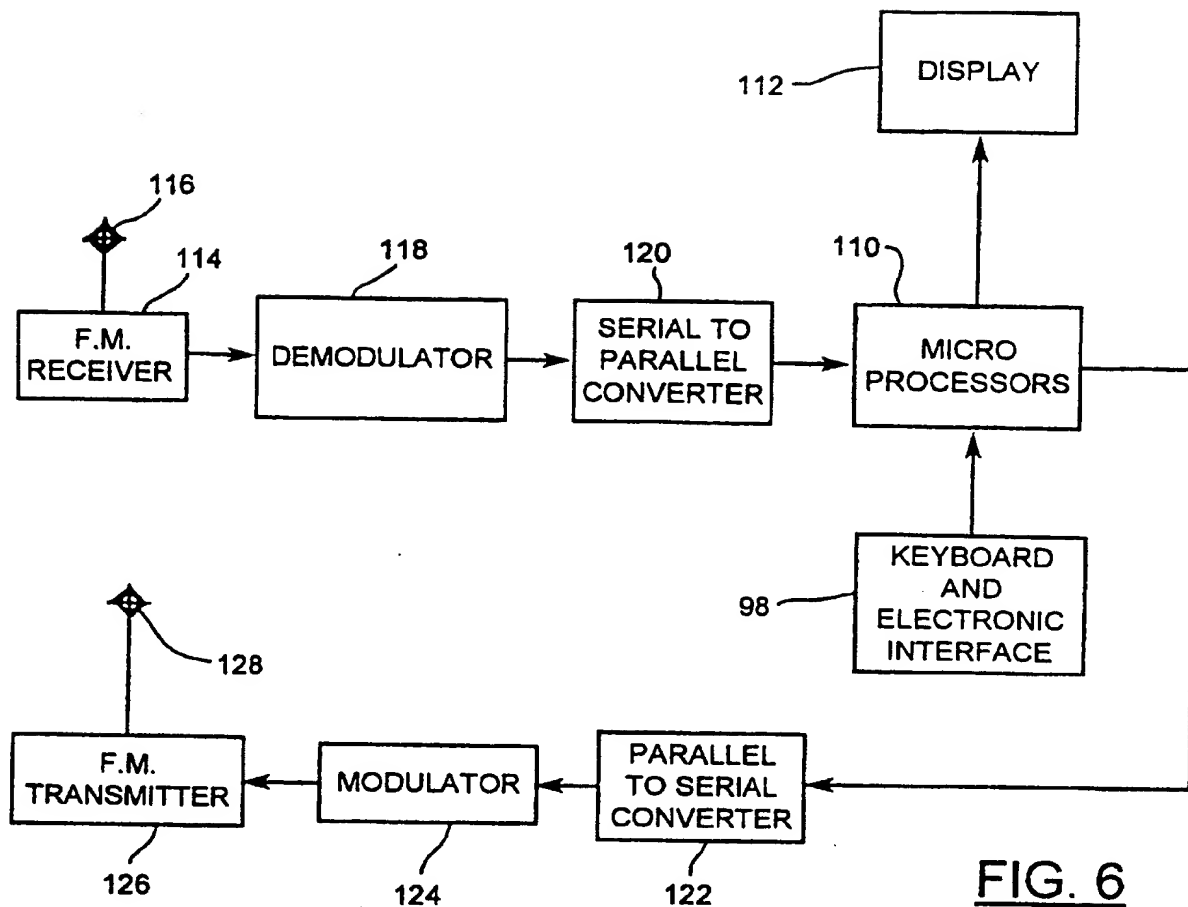
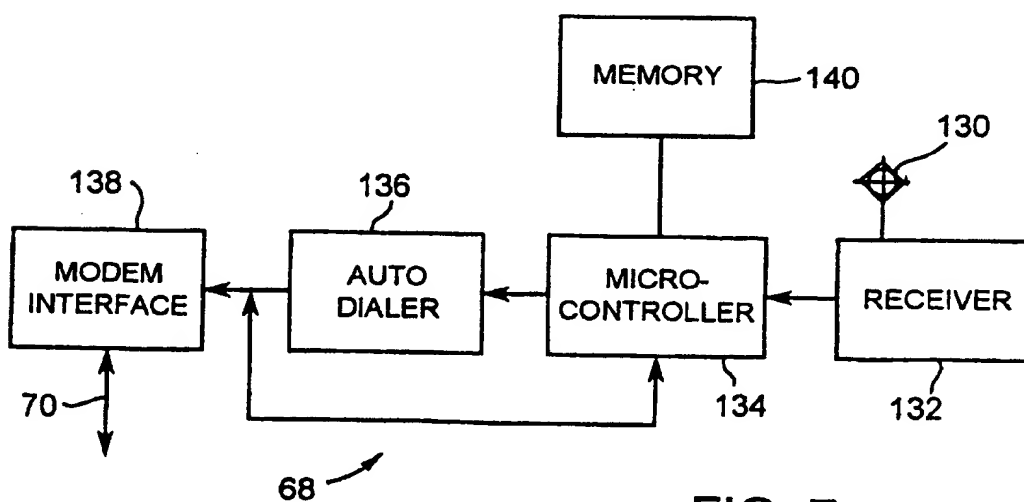
FIG. 4

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FIG. 5

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FIG. 6FIG. 7

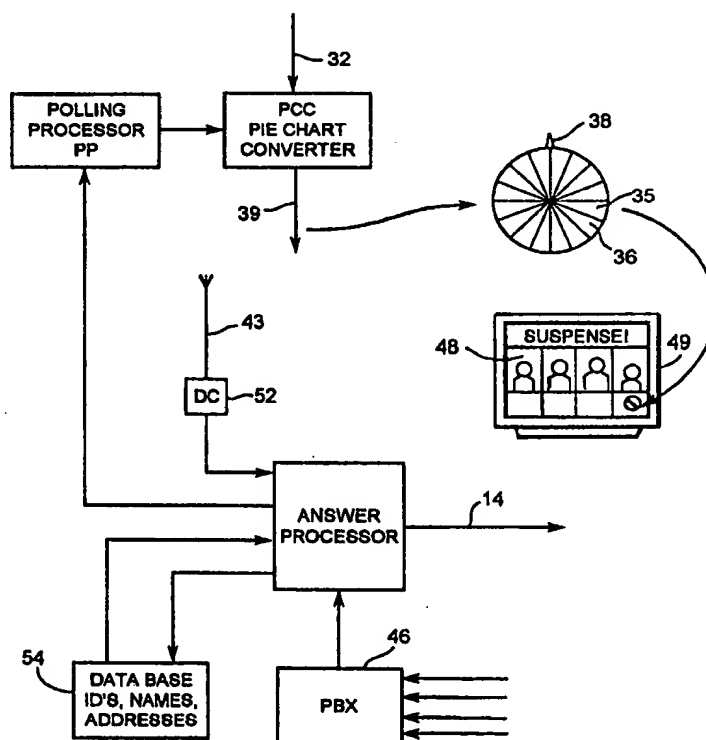
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant: STEIN, Adrian (legal representative of the deceased inventor) [CA/CA]; 50A Hillholm Road, North York, Ontario M2J 2H1 (CA). (72) Inventor: STEIN, Alfred (deceased). (74) Agent: PARSONS, Richard, A., R.; Ridout & Maybee, Suite 2400, One Queen Street East, Toronto, Ontario M5C 3B1 (CA).		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 23 April 1998 (23.04.98)	

(54) Title: INTERACTIVE BROADCASTING SYSTEMS

(57) Abstract

An interactive television or video system is disclosed, for communicating questions, means for distributing an encoded data channel in combination with the video signal for communicating qualification data, means at the user terminals for entering answer data (44), assessing the answer data against the qualifying data, and scoring the answer data to provide user scores, means for polling the user terminals to compare their user scores with an iteratively altered qualifying score level until the number of qualifying terminals falls within a predetermined range, and means to collect data from the then qualified terminals. The qualification data is preferably a subset or surrogate of data representing wanted answers. The encoded data is preferably transmitted as pie-charts (35) superimposed on images which are broadcast (48), the pie-charts being decoded by transducers affixed to the screens (49) of user terminals.



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INTERNATIONAL SEARCH REPORT

Intern: al Application No
PCT/CA 97/00577

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A63F9/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A63F H04H G09B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 120 076 A (LUXENBERG ROBERT A ET AL) 9 June 1992	1
Y	see column 1, line 57 - line 68 see column 2, line 27 - line 35 see column 2, line 50 - line 53 see column 2, line 59 - line 64 see column 3, line 37 - line 53 see column 3, line 66 - line 68 see column 4, line 15 - line 34 see column 6, line 3 - line 12 ---	2,3,9,10
Y	US 4 830 618 A (DAVID MORTON E) 16 May 1989 see column 2, line 12 - line 20 see abstract -----	2,3,9,10

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

12 November 1997

Date of mailing of the international search report

25.02.98

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-3,9,10
Obtaining response data from a limited number of participants and defining qualification criteria
2. Claims 4-8
Ensuring compatibility with a wide range of user video reproduction equipment

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
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1-3,9,10

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- ☐ The additional search fees were accompanied by the applicant's protest.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 97/00577

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5120076 A	09-06-92	US 5013038 A	07-05-91
		AT 109018 T	15-08-94
		DE 69011128 D	01-09-94
		DE 69011128 T	12-01-95
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		WO 9108810 A	27-06-91

US 4830618 A	16-05-89	NONE	

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